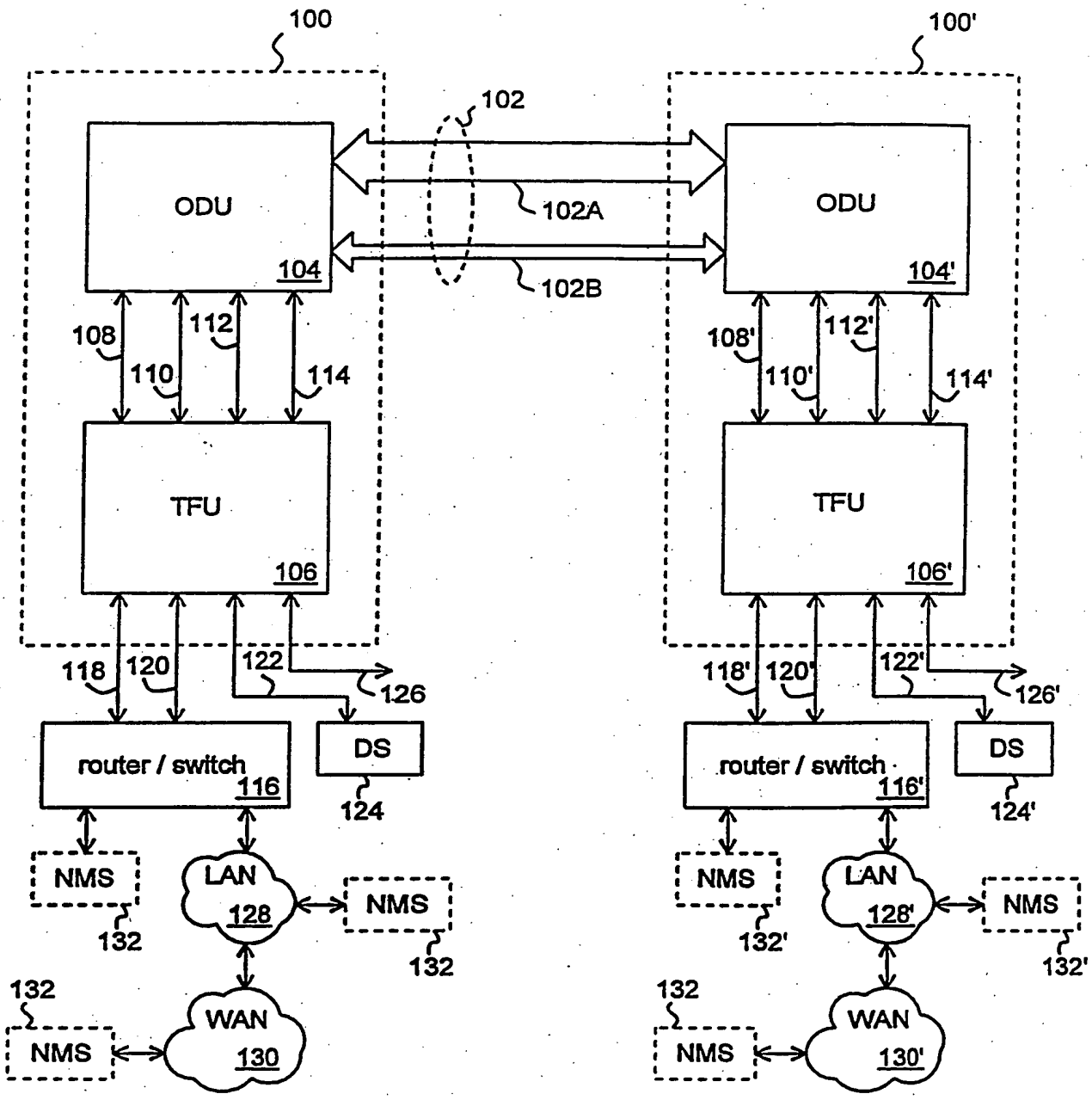


Fig. 1

Fig. 2A

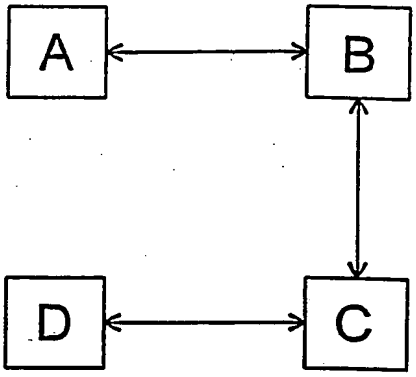


Fig. 2B

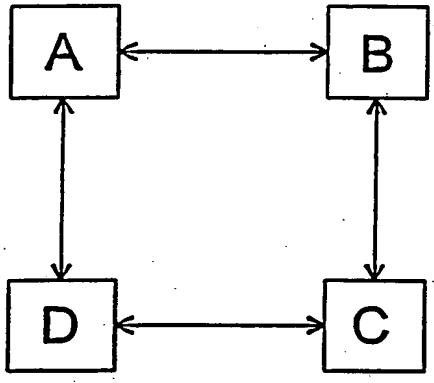


Fig. 2C

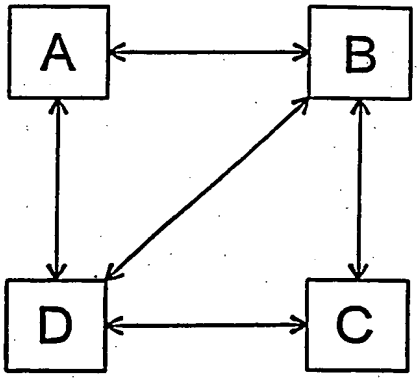


Fig. 2D

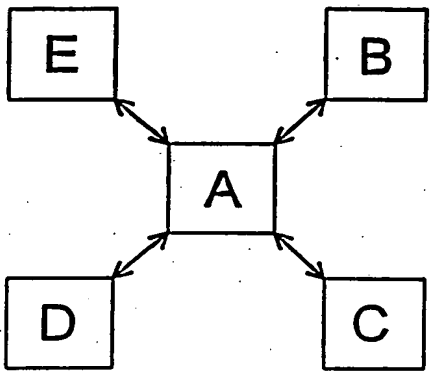


Fig. 2E

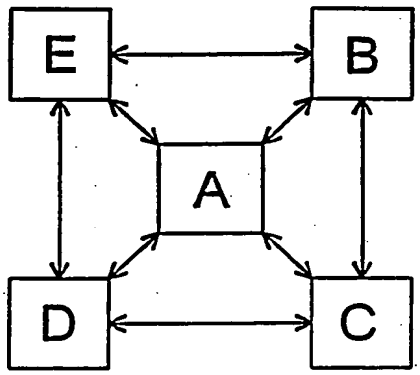


Fig. 2F

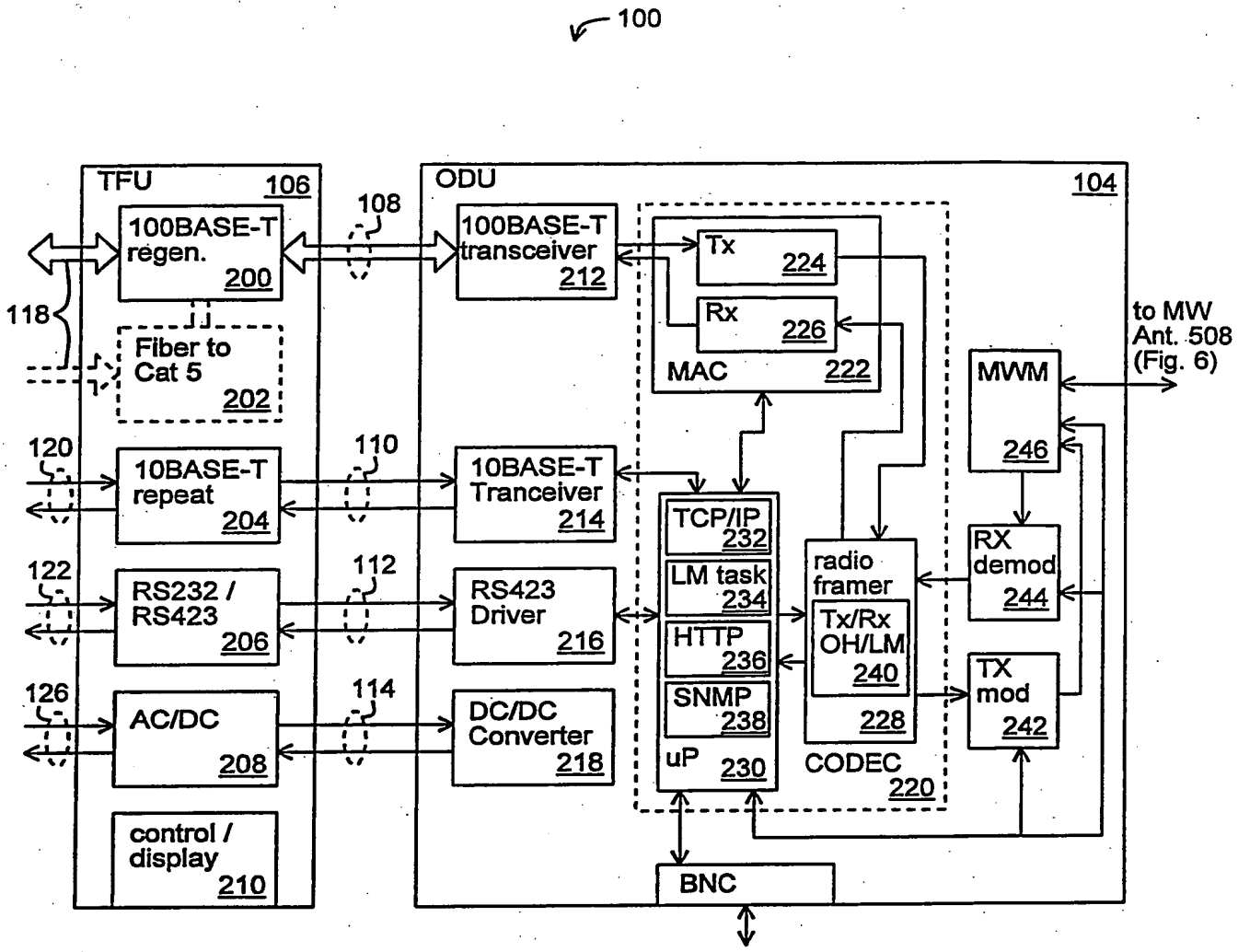


Fig. 3

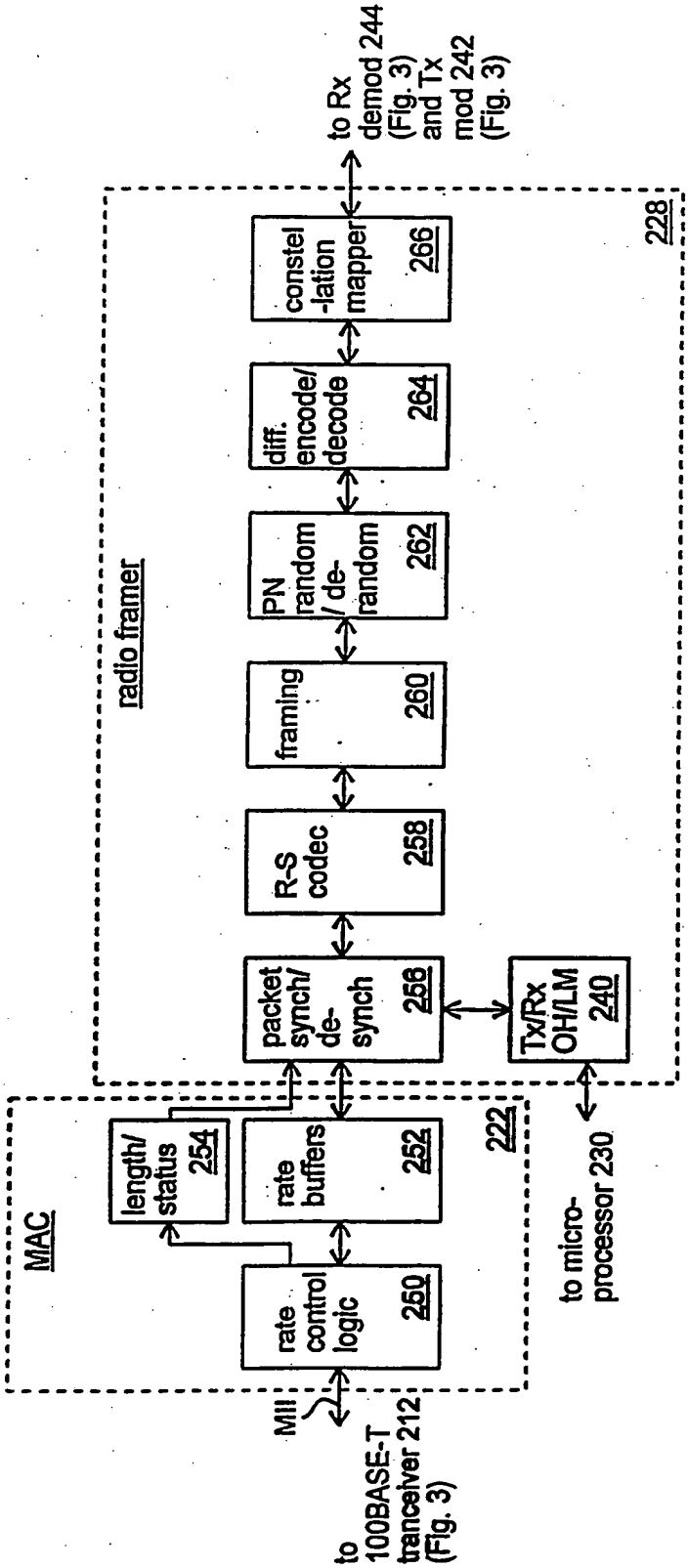


Fig. 4

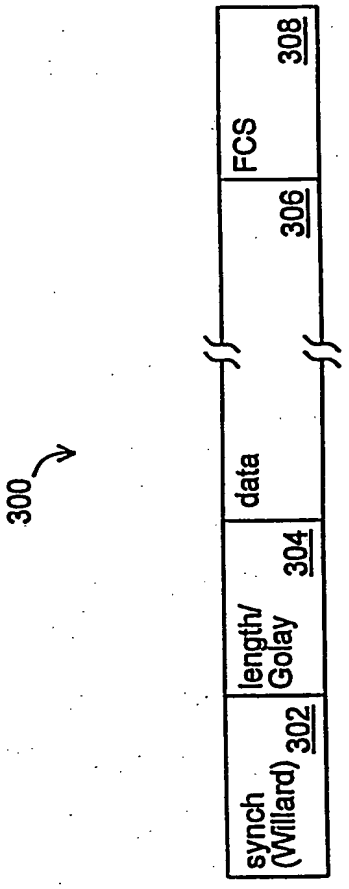


Fig. 5

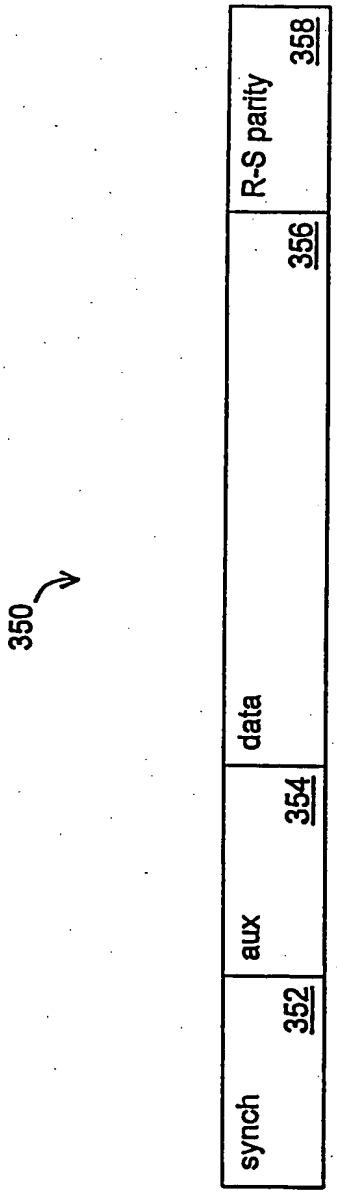


Fig. 6

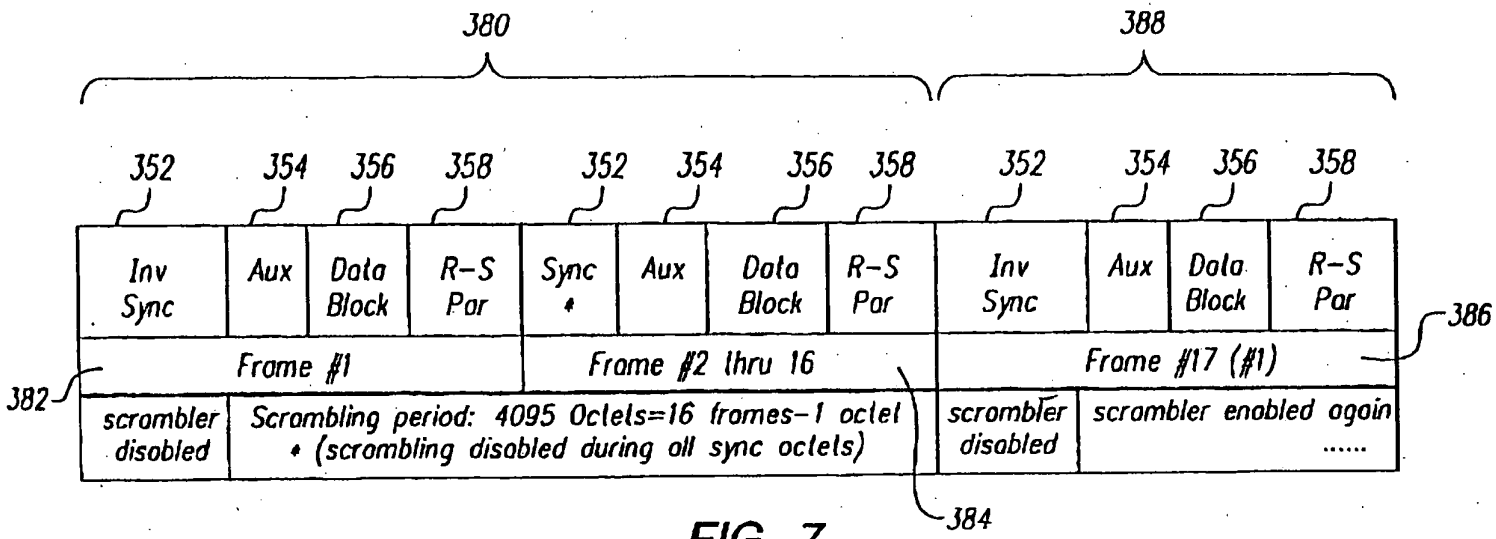


FIG. 7

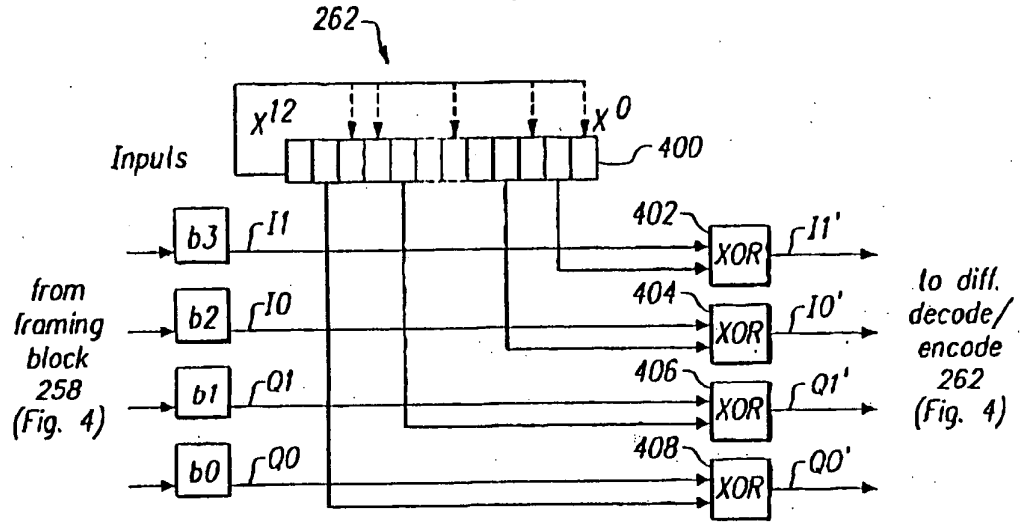


FIG. 8

```
Quad  = 2*I1'+Q1';          - Map Quadrant Tag [0 1 2 3]
Phi   = [0 1 3 2] ;         - to Angle = [0 1 2 3]
Angle = Phi(Quad)
Sum   = (Sum+Angle)modulo 4 ;
I1"   = bit 1 of Sum ;  I0"   = I0';
Q1"   = bit 0 of Sum ;  Q0"   = Q0';
```

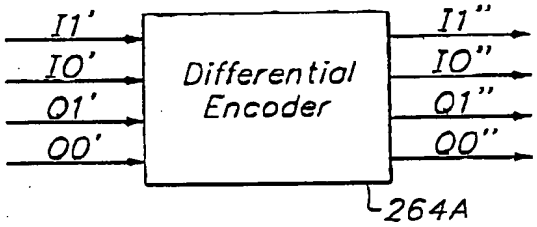


FIG. 9

```
Angle = 2*RxIs'+ RxQs' ;
Phi'  = [0 1 3 2] ;
Diff  = (Phi'(Angle)-Phi0) modulo 4 ;
Phi0  = Phi'(Angle) ;
RxIs  = bit 1 of Phi'(Diff) ;  RxIm = RxIm' ;
TxIs  = bit 0 of Phi'(Diff) ;  RxQm = RxQm' ;
```

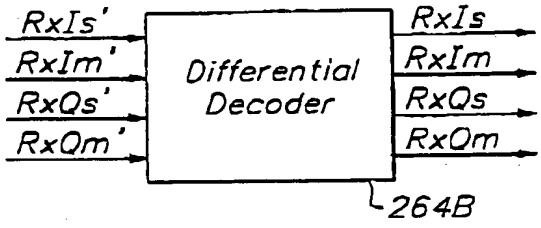
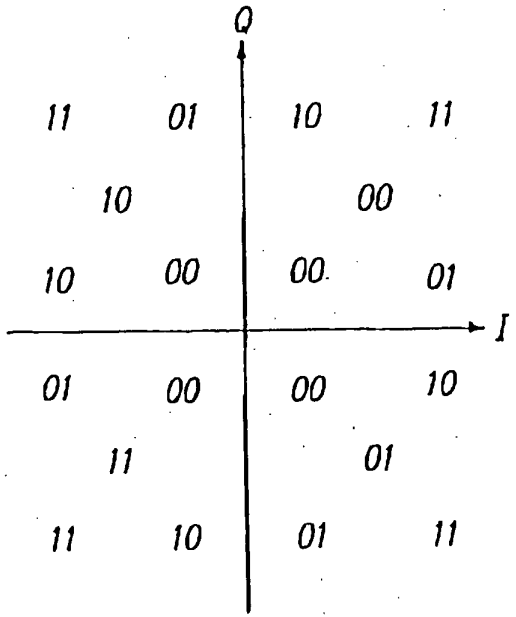


FIG. 10

FIG. 11



Normal Font
I0",Q0"

Bold Font
I1",Q1"

Input Symbols
Shown in Output
Symbol Position

Xs,Xm outputs are
(00,01,10,11)
left-right, bottom-top
(offset binary format)

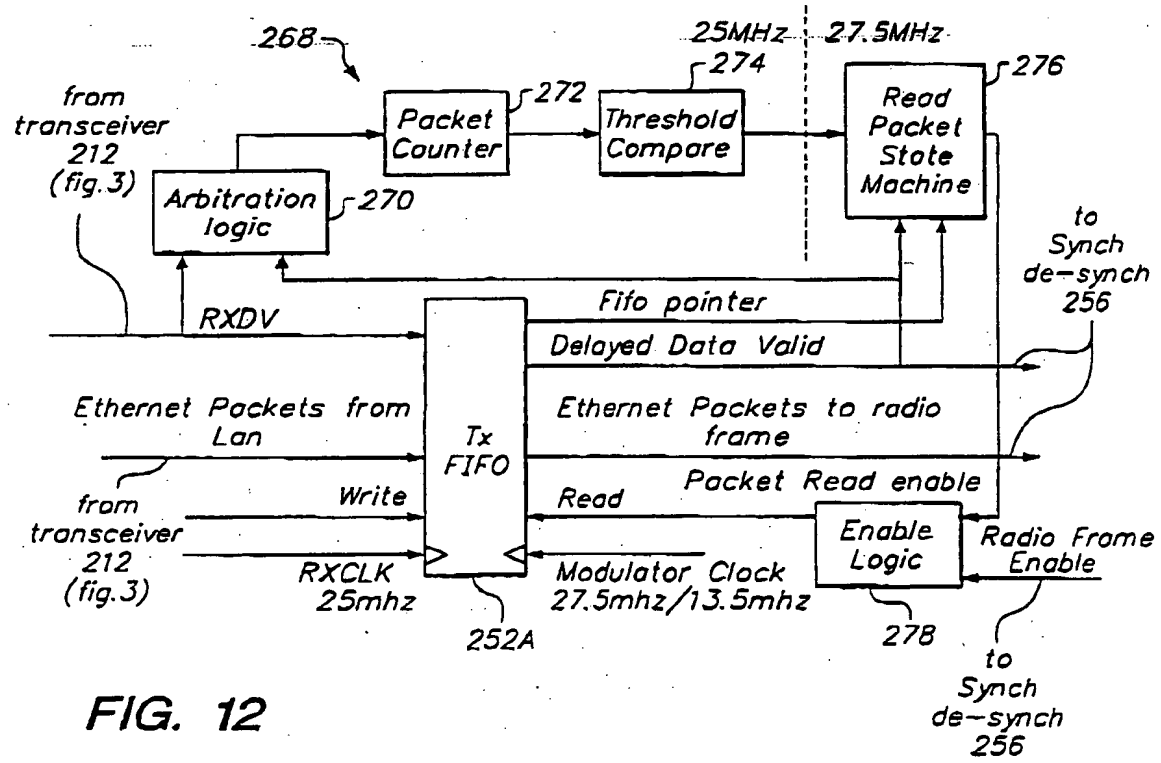


FIG. 12

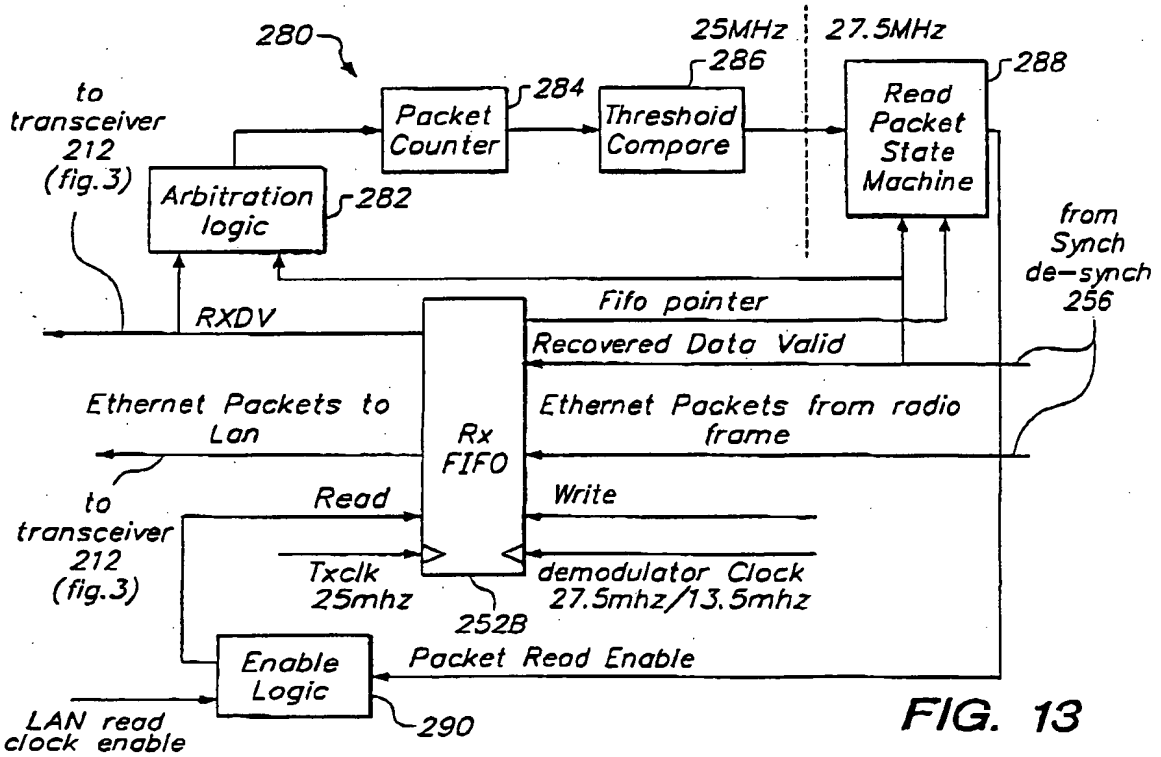


FIG. 13

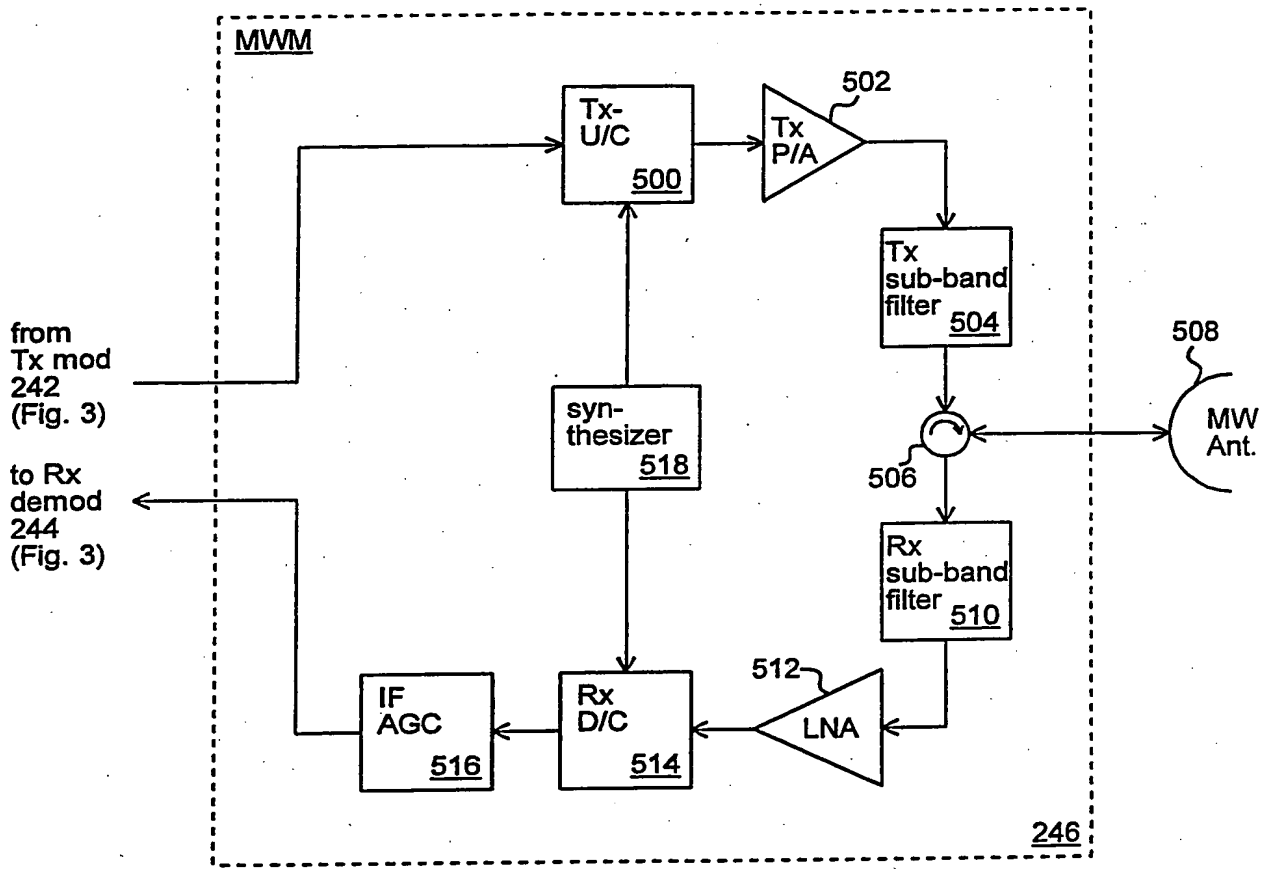


Fig. 14

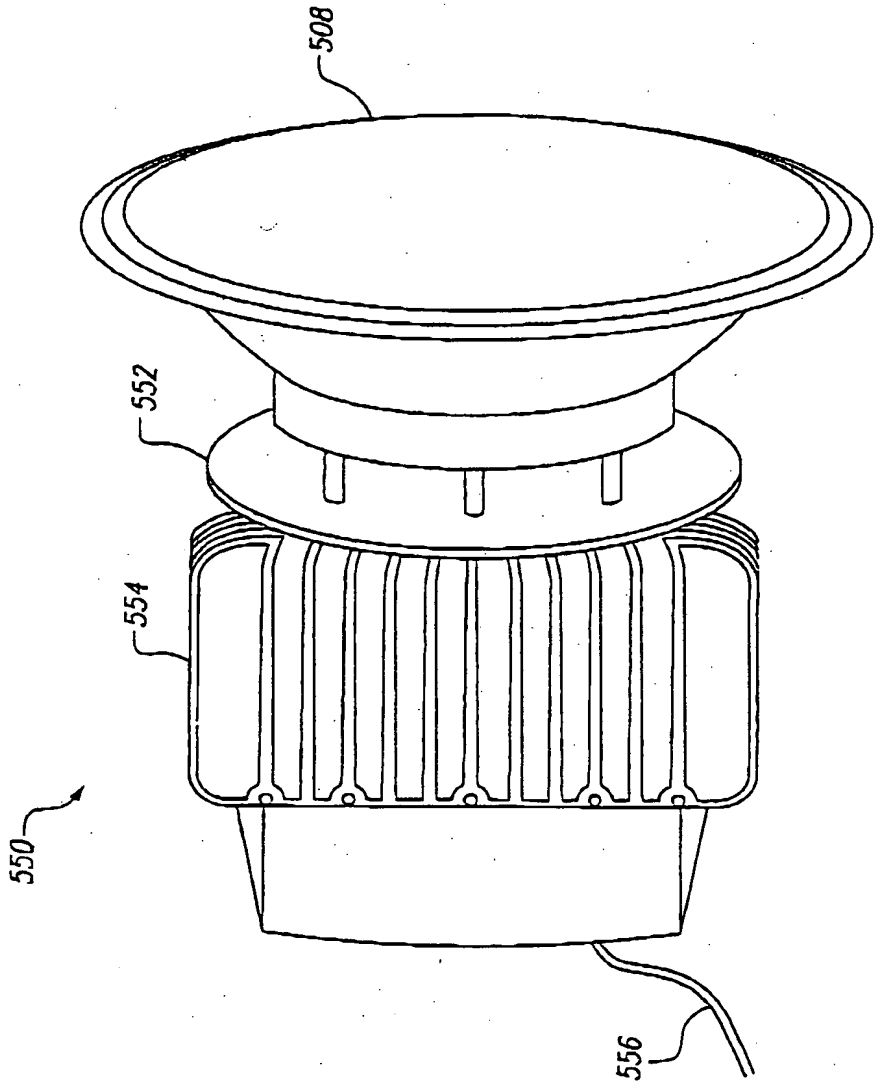


FIG. 15

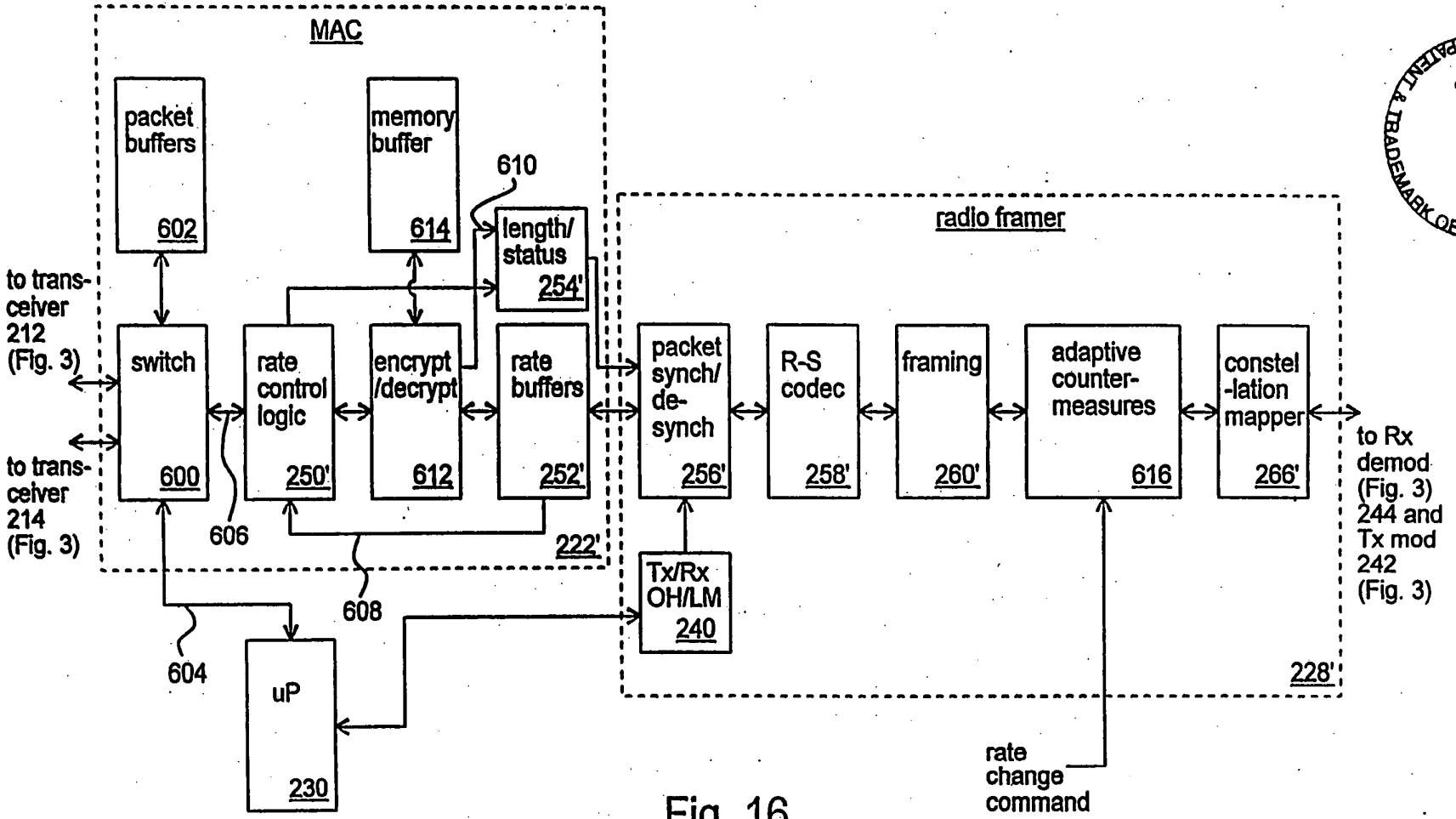


Fig. 16

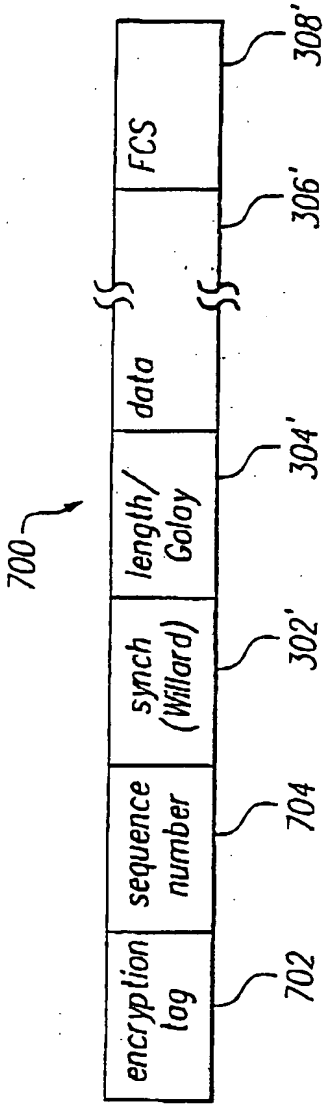
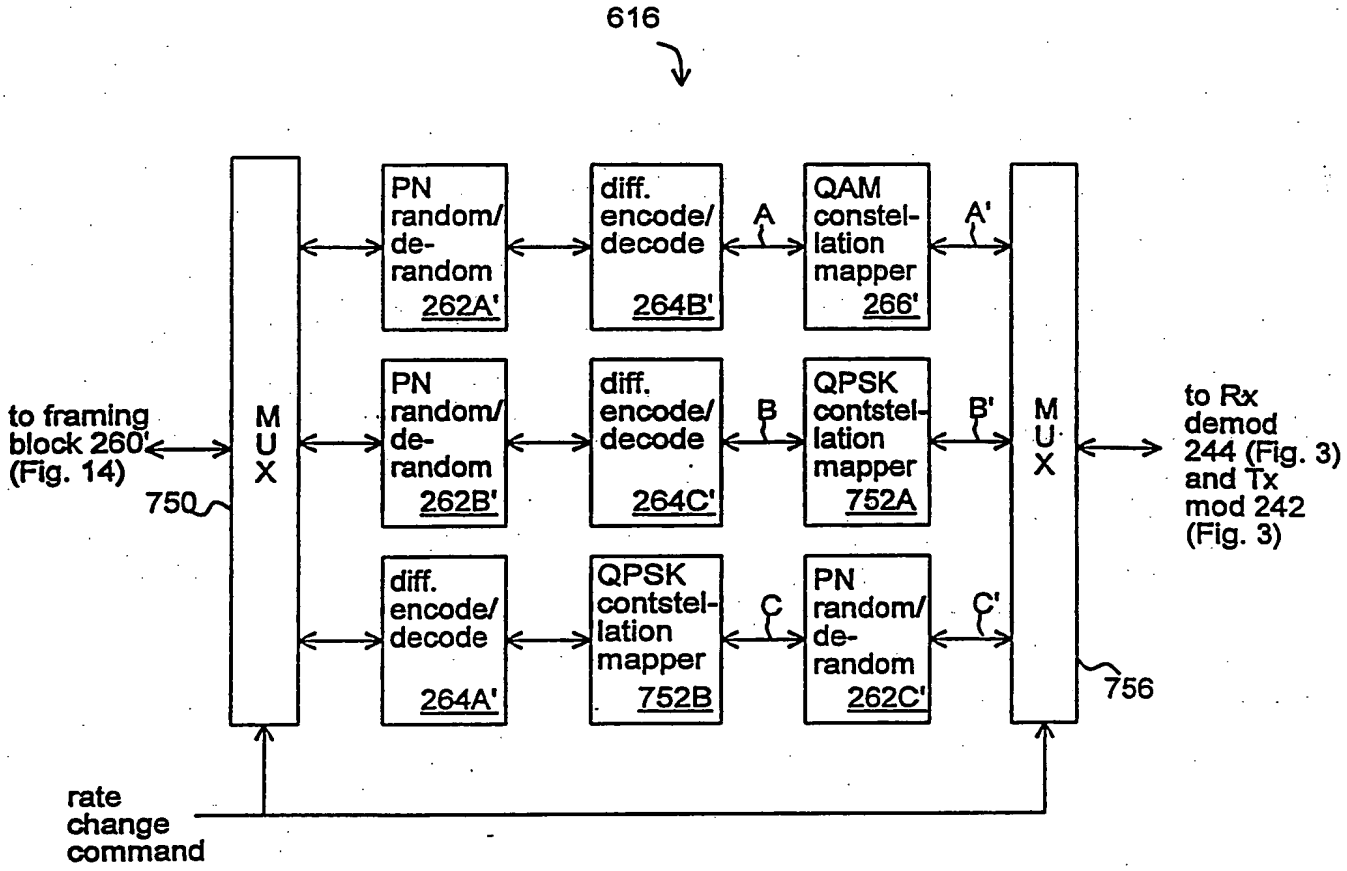


FIG. 17



A: data rate = 4 bits/symbol, symbol rate = 27.5 Msymbols (mega-symbols)/second

A': data rate = 4 bits/symbol, symbol rate = 27.5 Msymbols/second

B: data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

B': data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

C: data rate = 2 bits/symbol, symbol rate = 3.4375 Msymbols/second

C': data rate = 2 bits/symbol, symbol rate = 27.5 Msymbols/second

Fig. 18

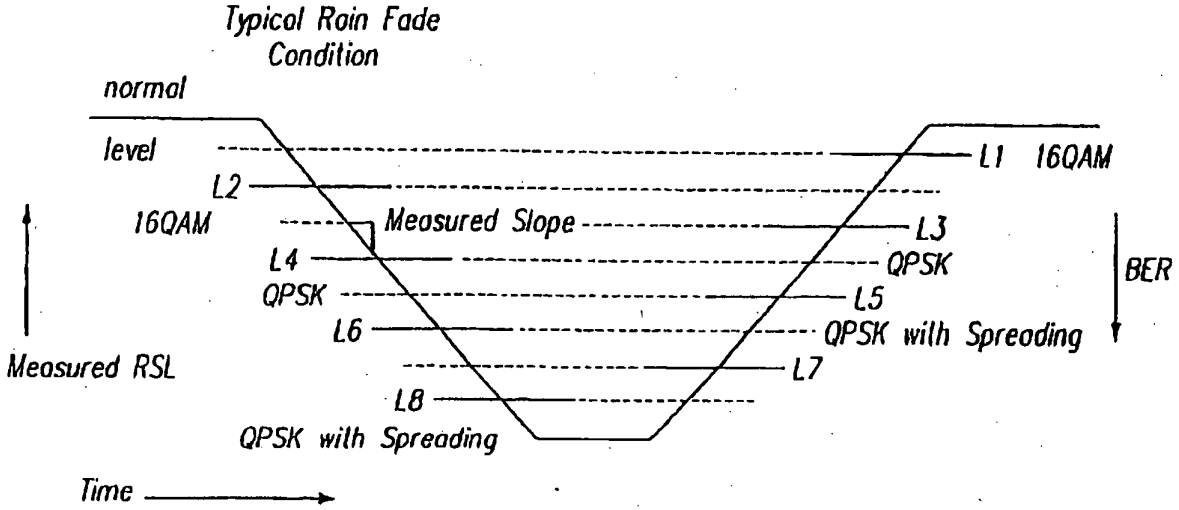


FIG. 19

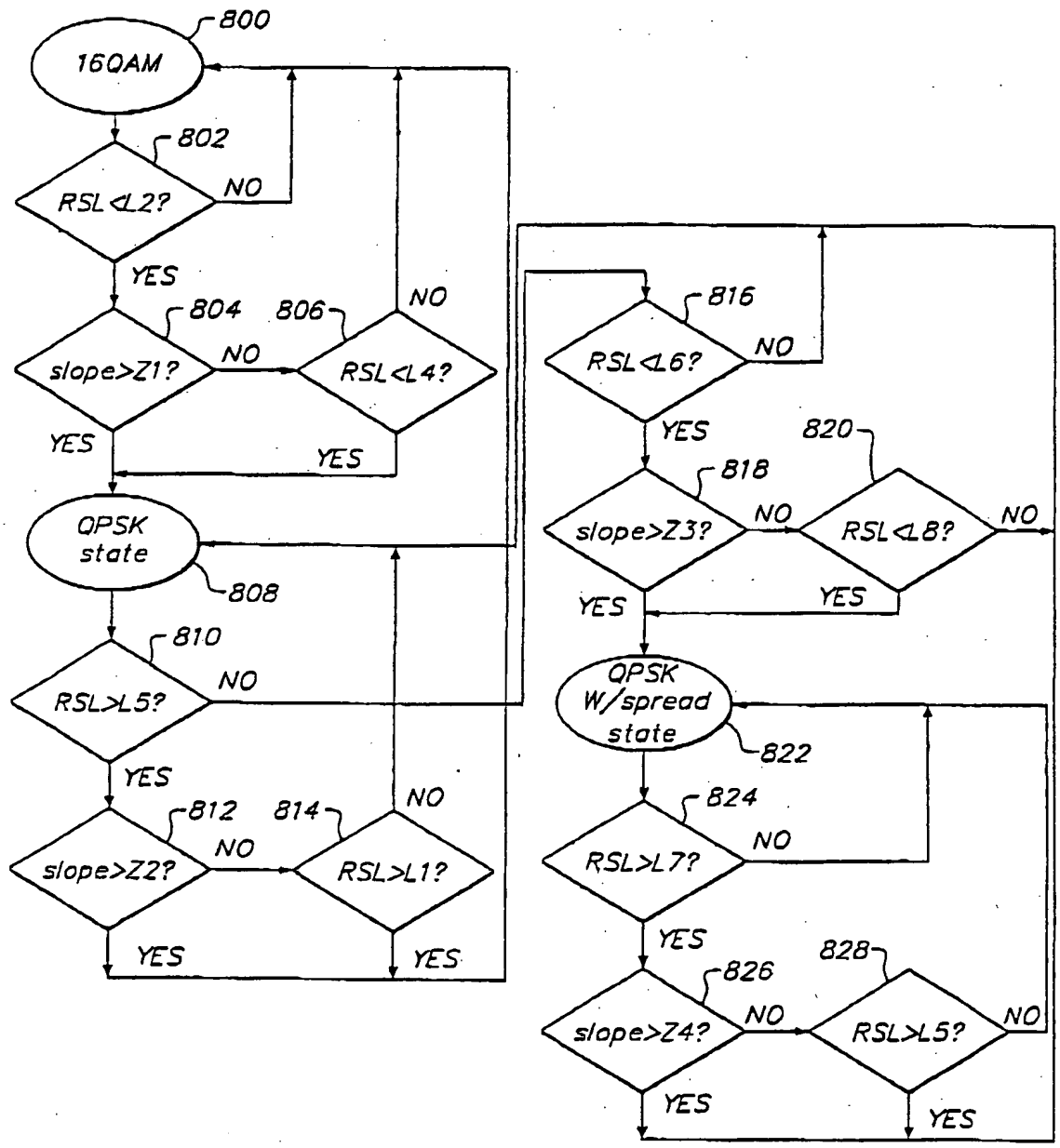


FIG. 20

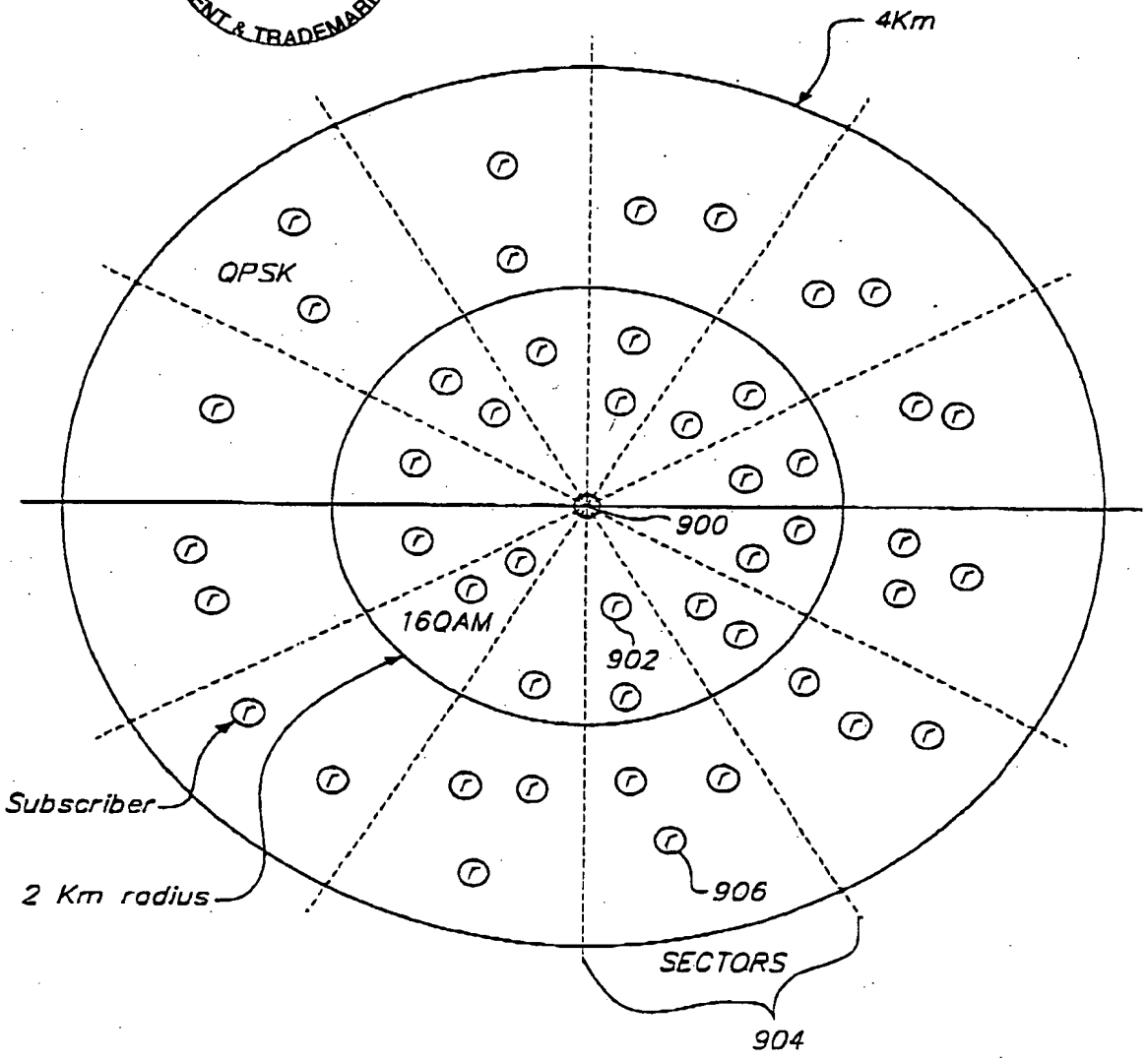


FIG. 21

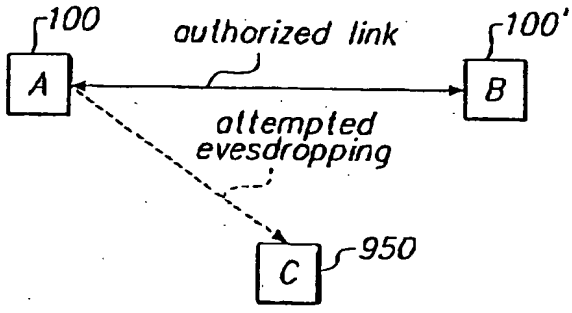


FIG. 22